

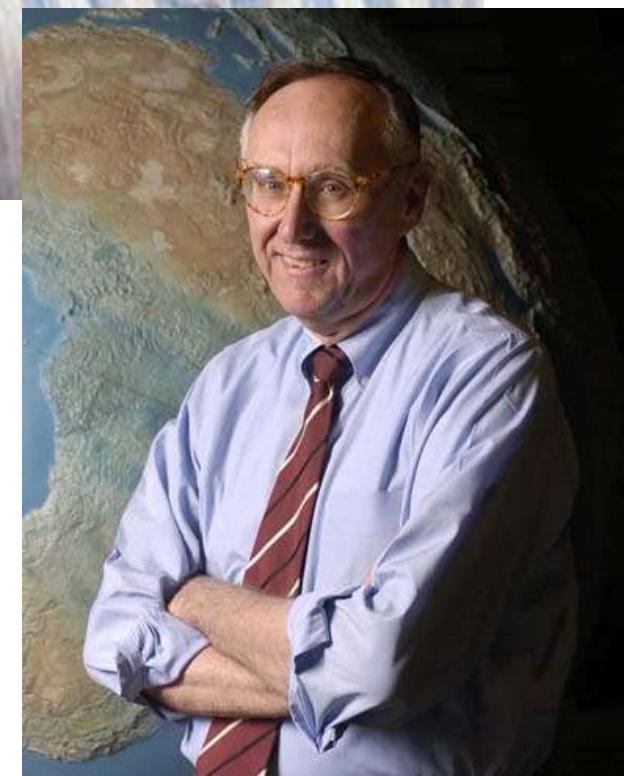
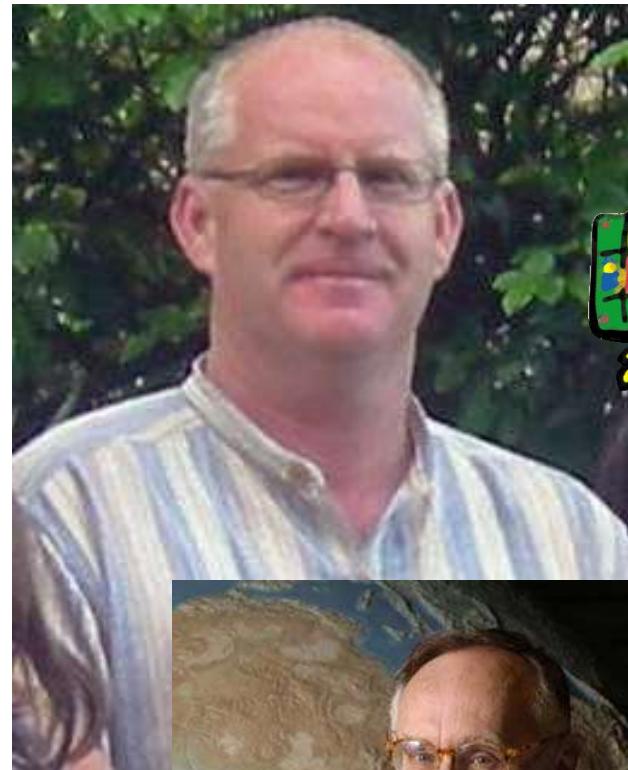
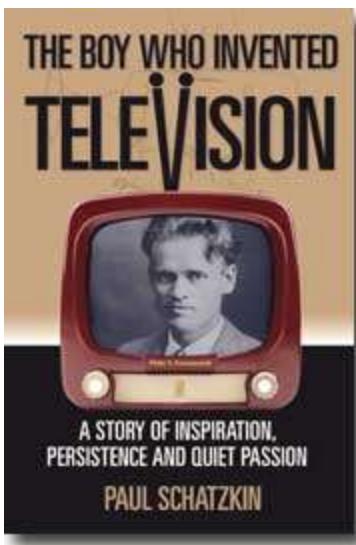
ArcSDE's

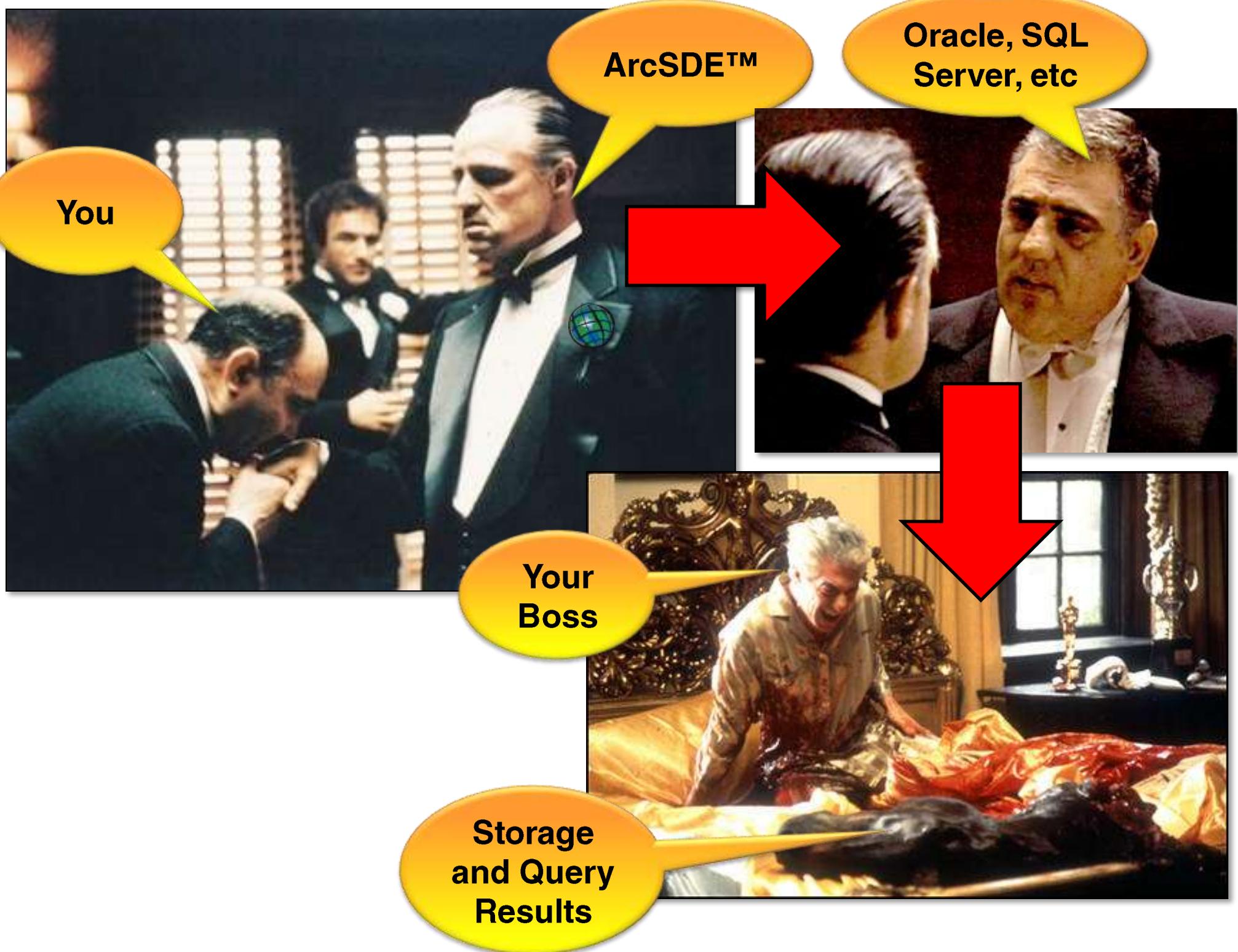
MAGIC'S
BIGGEST SECRETS
FINALLY REVEALED

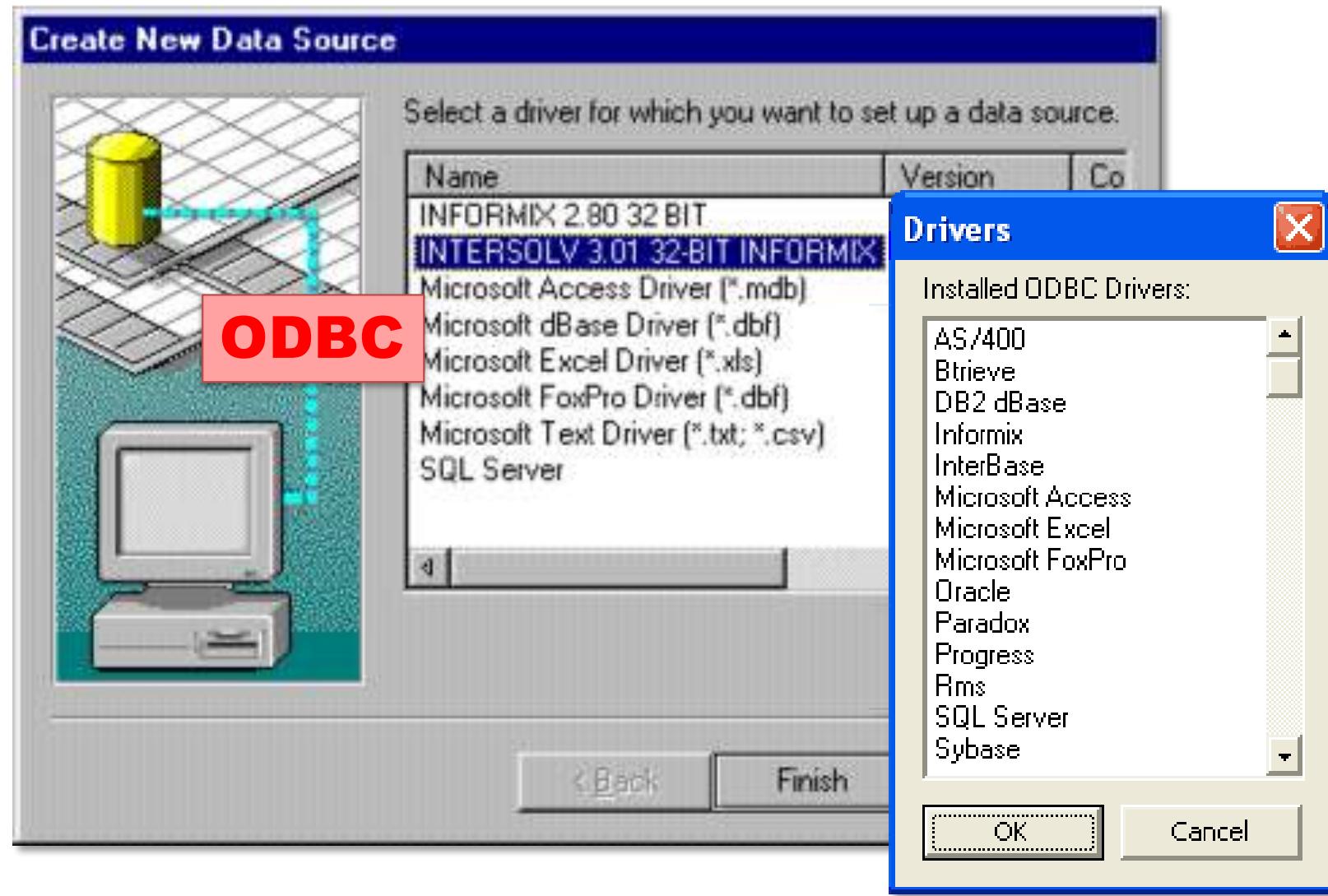
History

- Announced by ESRI as Spatial DataBase Engine (SDBE) at GIS '95
 - Acquired via Salamanca Software Pty Ltd (SalSoft)
 - Originally developed by Geographic Technology Incorporated (GTI) in Bellingham, WA









Open DataBase Connectivity (ODBC): universal data API independent of programming languages, database vendors and operating systems

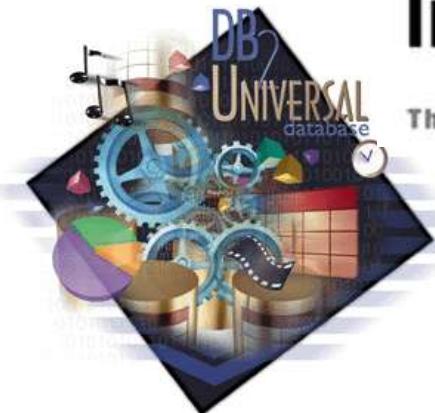
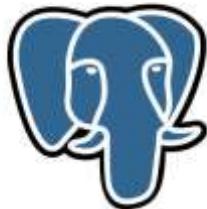
ORACLE



Microsoft

SQL Server 2008

PostgreSQL



Informix
SOFTWARE
The database company™



ArcSDE™



“Geospatial ODBC”

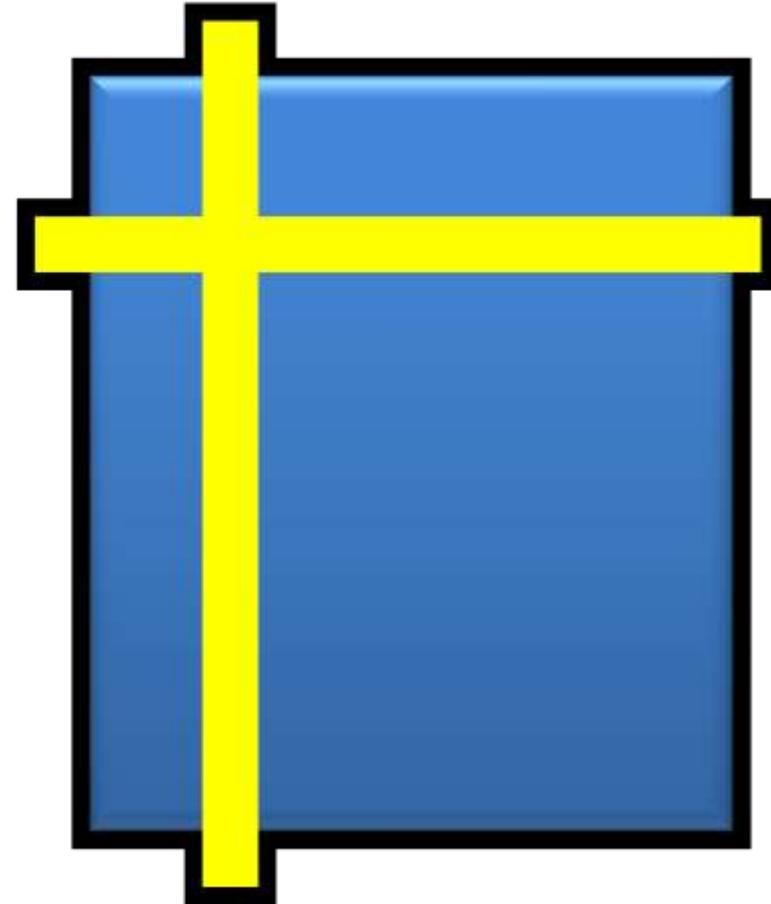
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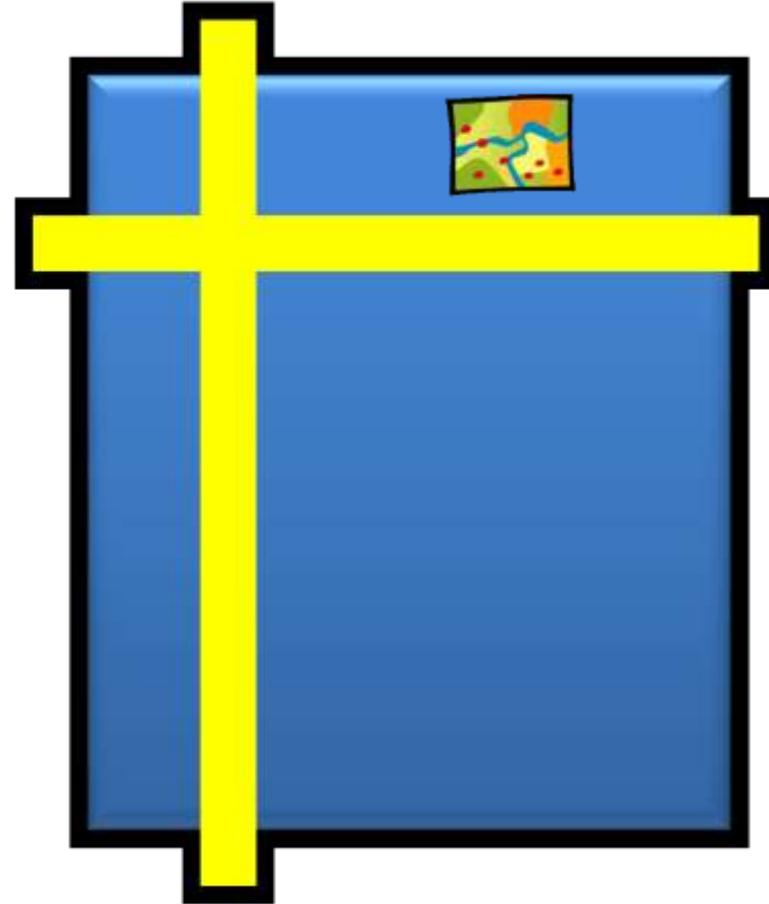
ARC

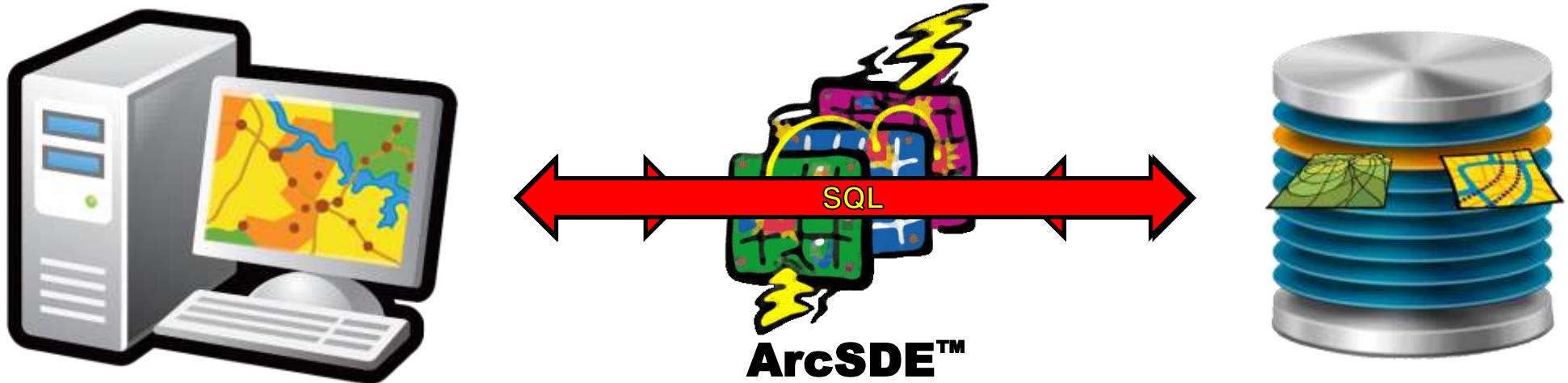
.SHP



INFO

.DBF





Functionality

Geometry storage in standard DBMSs

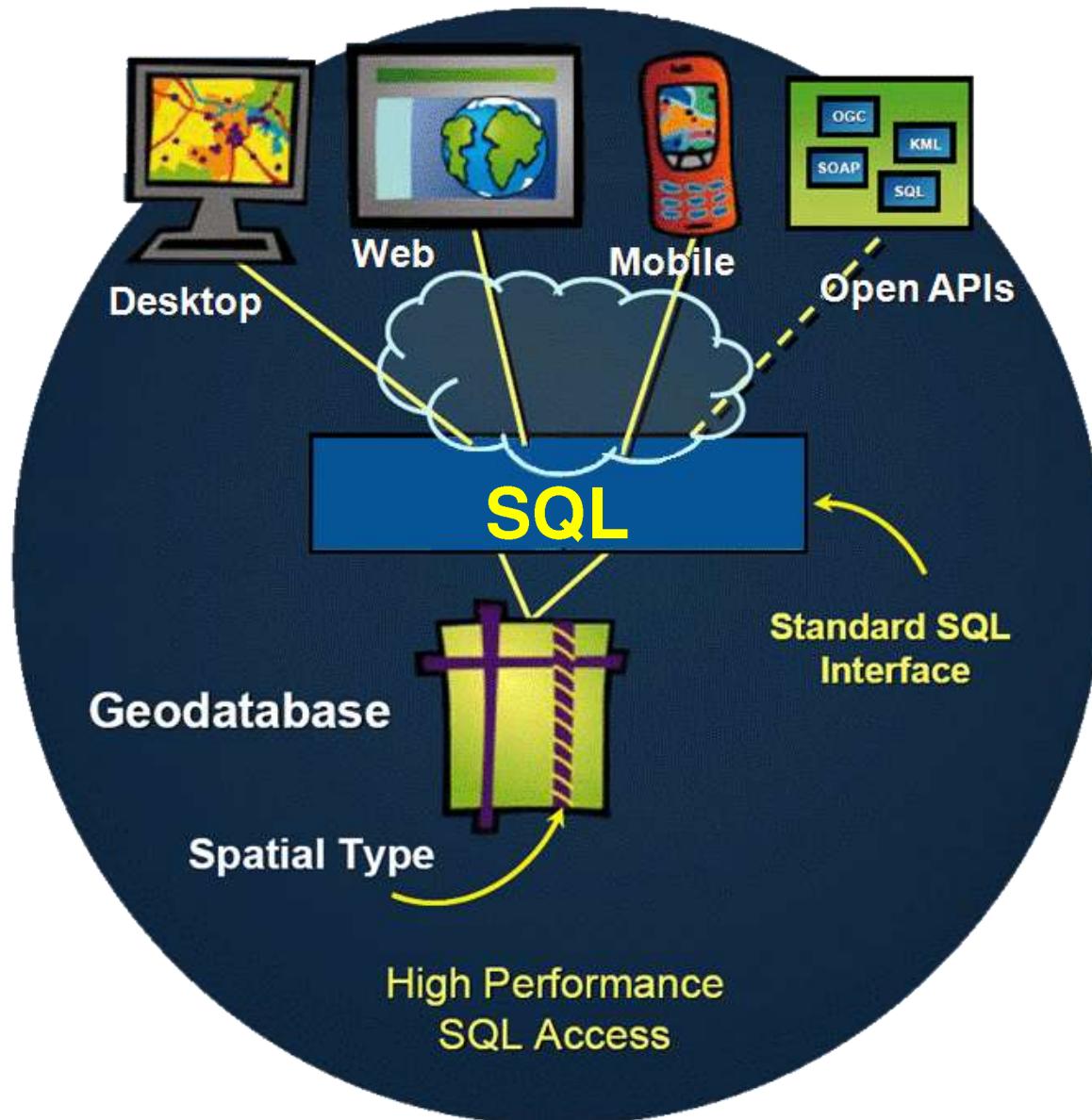
Versioned multi-user editing

Spatial queries and indexing

Topologies

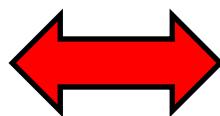
Rasters

GUI editing and analysis interface

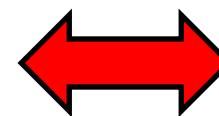


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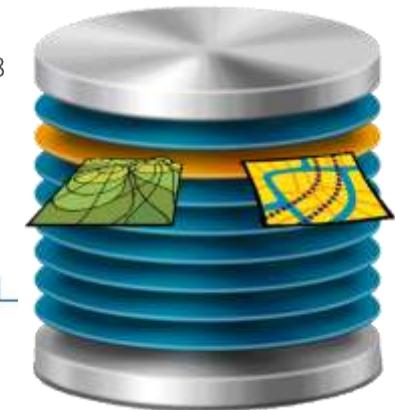
Geospatial Education and Training
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Microsoft
SQL Server 2008



PostgreSQL

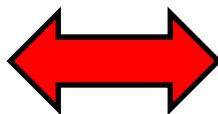


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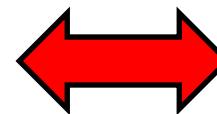
Functionality	SQL-compliant?	Workaround
Geometry storage		
Versioning		
Spatial queries, indexing		
Topologies		
Rasters		
GUI editing interface		

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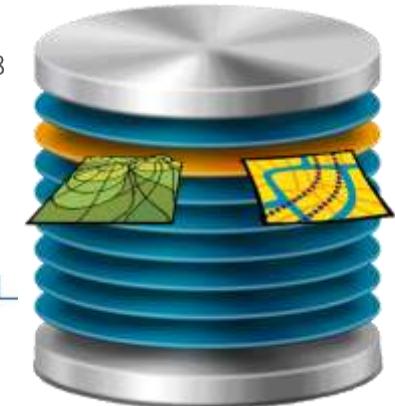
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Microsoft
SQL Server 2008



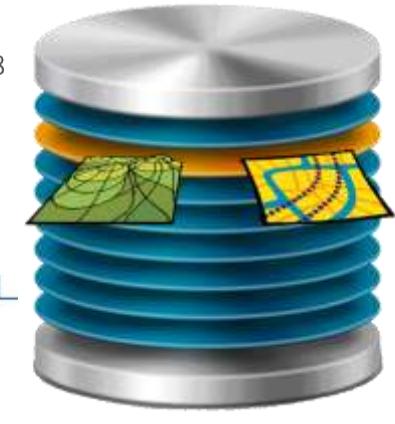
PostgreSQL



Functionality	SQL-compliant?	Workaround
Geometry storage		
Oracle	ESRI SDE Binary	
PostGIS	ESRI SDE Binary	
SQL Server	ESRI SDE Binary	

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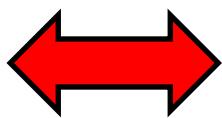
Geospatial Education and Training
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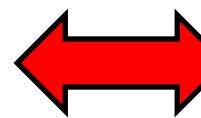
PostgreSQL



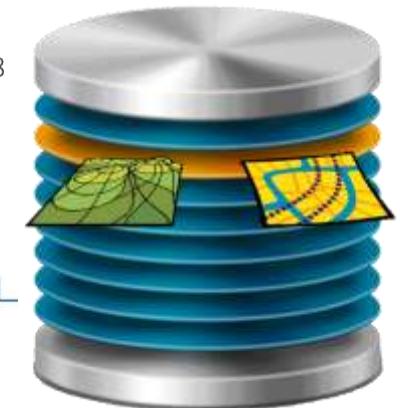
Functionality	SQL-compliant?	Workaround
Geometry storage		SDE_dbtune keyword: GEOMETRY_STORAGE
Oracle		OGC WKB ST_GEOMETRY SDO_GEOMETRY
PostGIS		ST_GEOMETRY PG_GEOMETRY
SQL Server		OGC WKB GEOMETRY GEOGRAPHY



Microsoft
SQL Server 2008



PostgreSQL



Functionality

SQL-compliant?

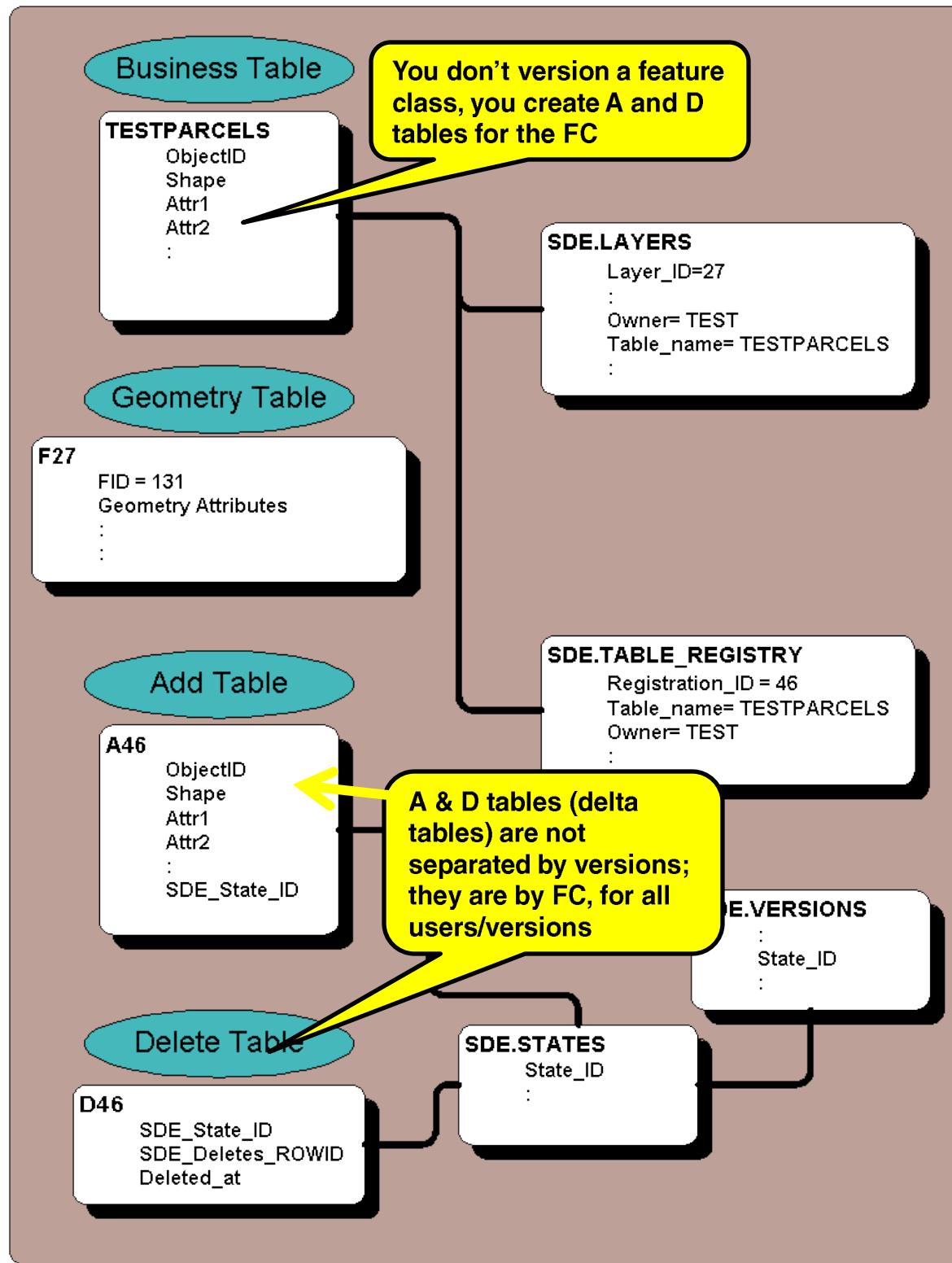
Versioning

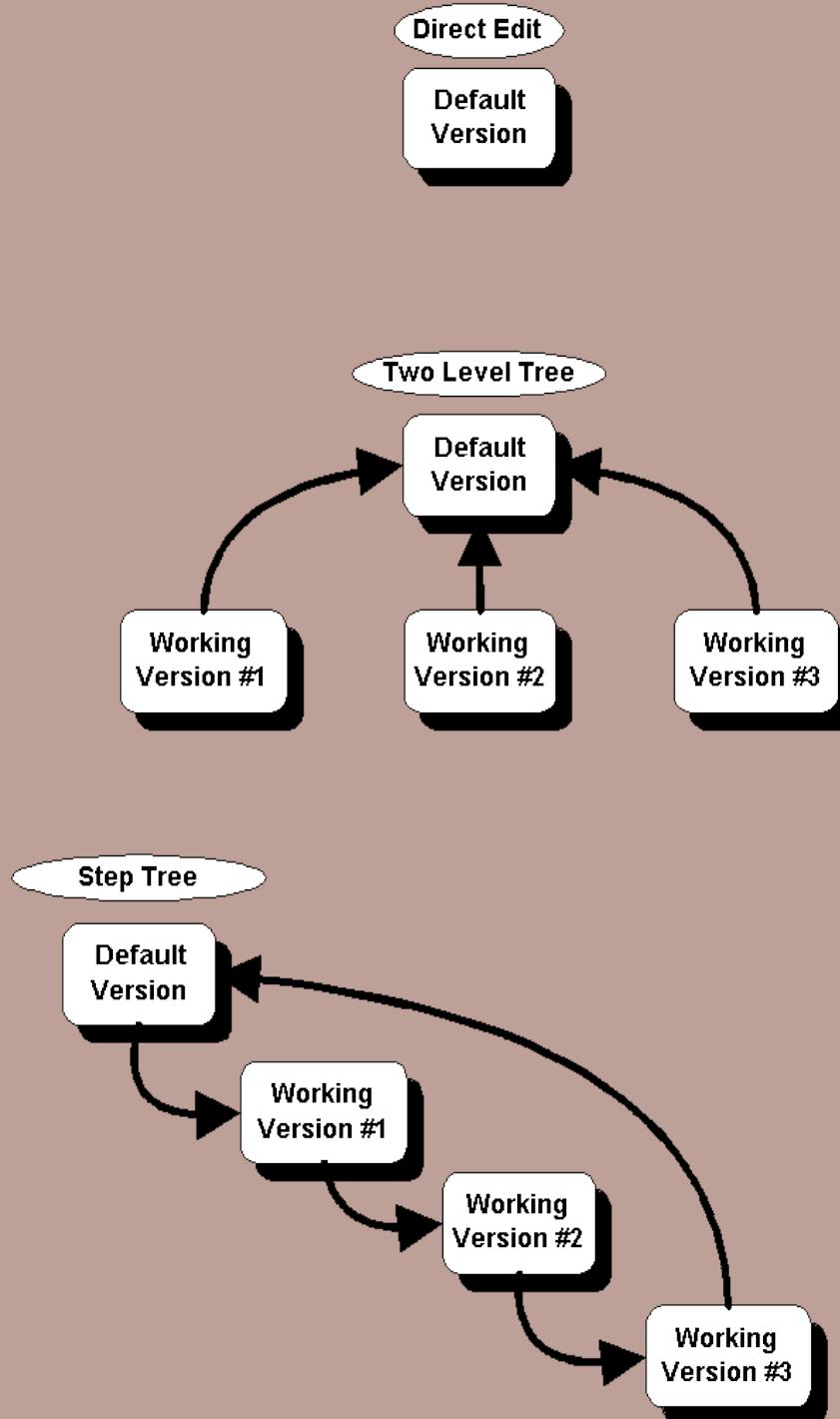


Workaround

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In a geodatabase with a large number of versions the number of states and supporting database rows will increase much faster than the number of features!

Persistent versions not only preserve state information they preserve “A” and “D” table entries even if those entries are subsequently posted to the default Version.



Functionality	SQL-compliant?	Workaround
Versioning	A green checkmark icon indicating compliance.	Use non-versioned editing or versioned editing with move to base option

Multi-user geodatabase editing environments

1. Non-versioned editing

- Directly edit the base tables
- Supports short transaction workflows
- Edits immediately available upon save

2. Versioned editing

- Available since initial ArcGIS release
- Supports long transaction workflows
- Lineage of change maintained by SDE tables

3. Versioned editing (with move to base)

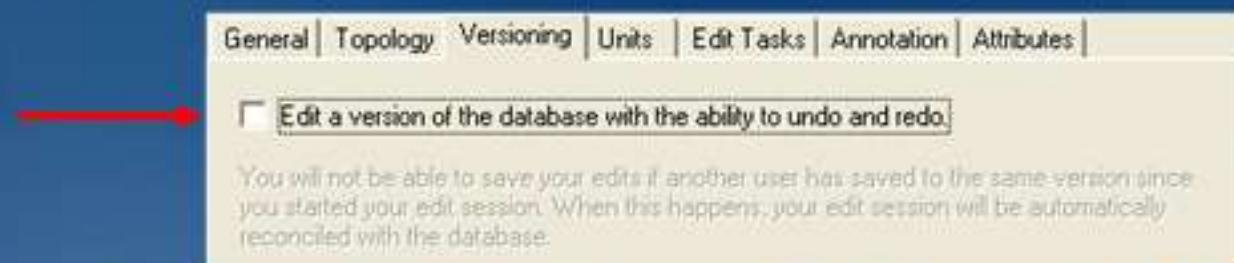
- Option of versioned editing
- If editing non-DEFAULT version, stores edits in delta tables
- Upon save or post to DEFAULT, edits are moved to the base tables

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Non-versioned editing

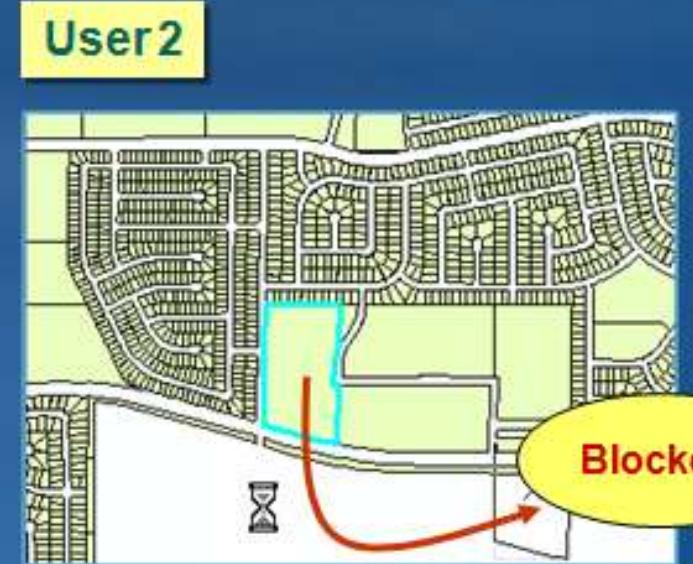
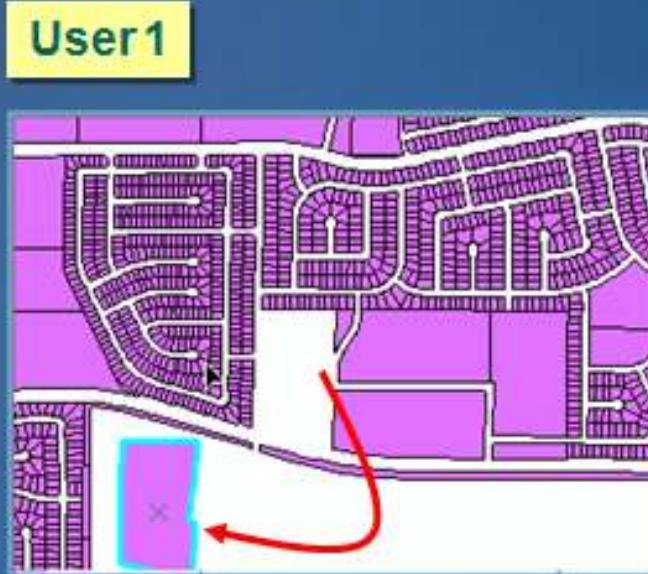
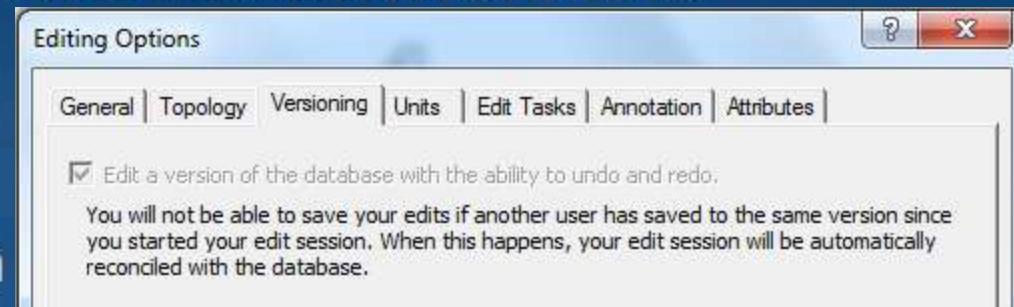
- Preserves last set of edits on a dataset



- Editing option for data that is used with non-ESRI clients
- Uses the underlying DBMS transaction model
 - Edits immediately available upon save
- Simple data only
 - Points, lines, polygons, annotation, & relationship classes
 - NO topology & geometric networks
- No archiving, geodatabase replication
- No conflict detection

Editing in a non-versioned environment

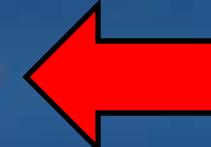
- Versioning tab
- Start Edit Session
- Exclusive database lock when updating feature(s)
 - Lock held until edit session is saved or rolled back
 - Hourglass  lingers; does not time out



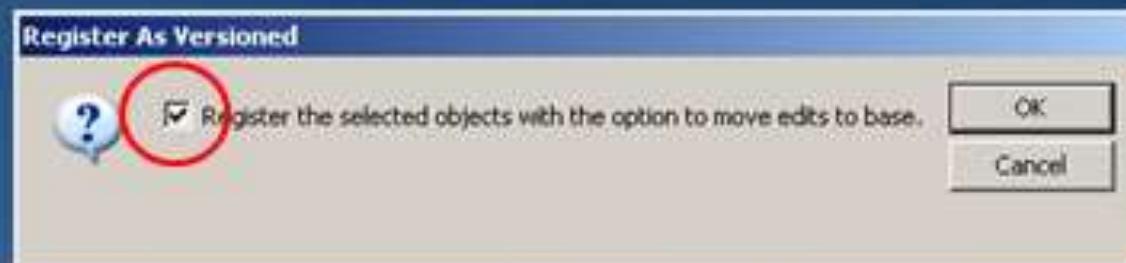
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Workflow considerations

- Concurrency issues must be identified
 - Design workflow to prevent/minimize blocking
 - Spatially distribute your editors (e.g., edit different areas)
 - Blocking related to DBMS isolation levels
- No conflict detection
 - Prevent/minimize lost edits by designing appropriate workflow
- Integrating non-ESRI applications
 - Edits immediately available upon save
 - Can use DBMS behavior to enforce integrity
- Geodatabase compress not necessary



Versioned editing with move to base



- Versioned behavior if editing dataset in **non-DEFAULT** version
- If editing **DEFAULT**, edits are applied to base tables
- Suggested for non-ESRI client interaction
- **Simple data only**
 - Points, lines, polygons, annotation, & relationship classes
- **No archiving, geodatabase replication**
- Supports undo/redo

Workflow considerations

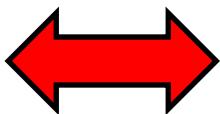
- IT integration
 - Uses DBMS behavior to enforce data integrity
 - Use geodatabase behavior for ArcGIS editing
- Versioning behavior on non-DEFAULT versions
 - Edits are stored in the delta tables
- No conflict detection on DEFAULT
 - Option: Use surrogate for conflicts before posting to DEFAULT
- Geodatabase compress necessary

Guidelines for using SQL and the Geodatabase

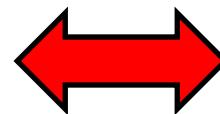
- Do perform spatial operations
- Do query spatial and attribute information
- Do Insert, Update and Delete geometries
 - As long as you pay attention to behavior
- Do Insert, Update and Delete attribute data
 - As long as you pay attention to behavior

Guidelines for using SQL and the Geodatabase

- Do not update the **objectid (row_id) value**
- Do not modify geometries for classes participating in topologies, geometric networks, network datasets, terrains, cadastral fabrics, geodatabase replication or feature linked annotation
 - Will not create dirty areas or be validated
 - Will not maintain connectivity in the logical network ...
- Do not update attributes which define geodatabase behavior
 - Enabled/Disabled attributes
 - Ancillary attributes
 - Weight attributes
 - Subtypes ...



Microsoft
SQL Server 2008

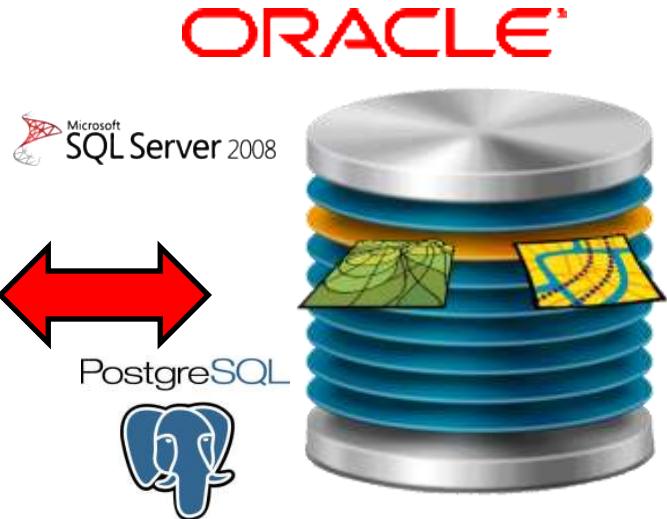
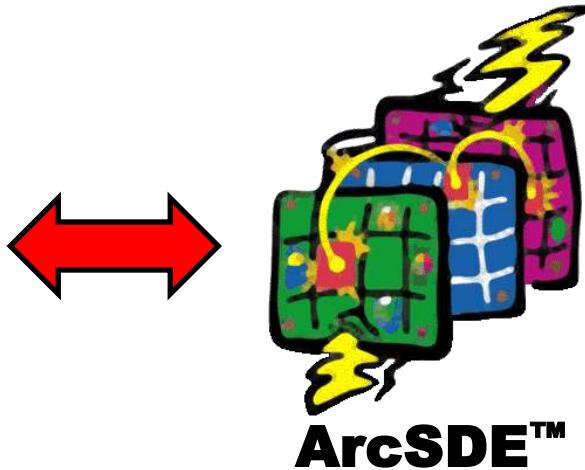


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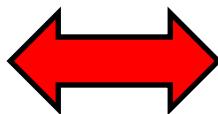
Functionality	SQL-compliant?	Workaround
Spatial queries and indexing		
Many spatial queries executed by SDE, not the database natively		

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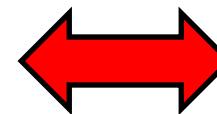
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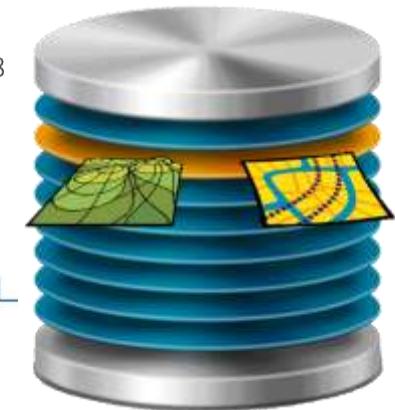
Functionality	SQL-compliant?	Workaround
Spatial queries and indexing		
Many spatial queries executed by SDE, not the database natively		Construct a view using RDBMS spatial query, then register the view with SDE



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SQL Server 2008



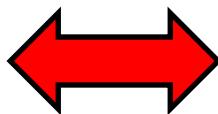
PostgreSQL



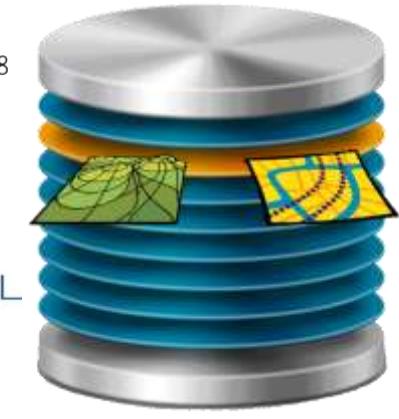
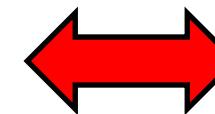
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Functionality	SQL-compliant?	Workaround
Spatial queries and indexing		
Many spatial queries executed by SDE, not the database natively		Construct a view using RDBMS spatial query, then register the view with SDE
Spatial indexing defaults to SDE grid indexing. If the layer extents are not specified, the maximum range of coordinates for the layer is used.		

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Microsoft
SQL Server 2008



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Functionality	SQL-compliant?	Workaround
Spatial queries and indexing		
Many spatial queries executed by SDE, not the database natively		Construct a view using RDBMS spatial query, then register the view with SDE
Spatial indexing defaults to SDE grid indexing. If the layer extents are not specified, the maximum range of coordinates for the layer is used.		Don't let SDE use its grid indexing: create spatial indices via RDBMS before registering tables with SDE.

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SDE_LAYERS table

LAYER-ID	DESC	DB_NAME	TABLENAME	SPATIAL_COLUMN
22	City Streets	ChulaVista	STREET	GEOM

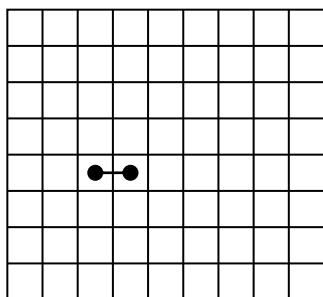


STREET table

NAME	GEOM	ADDR_LEFT	ADDR_RIGHT
E STREET	601	4001	4000

F22 feature table

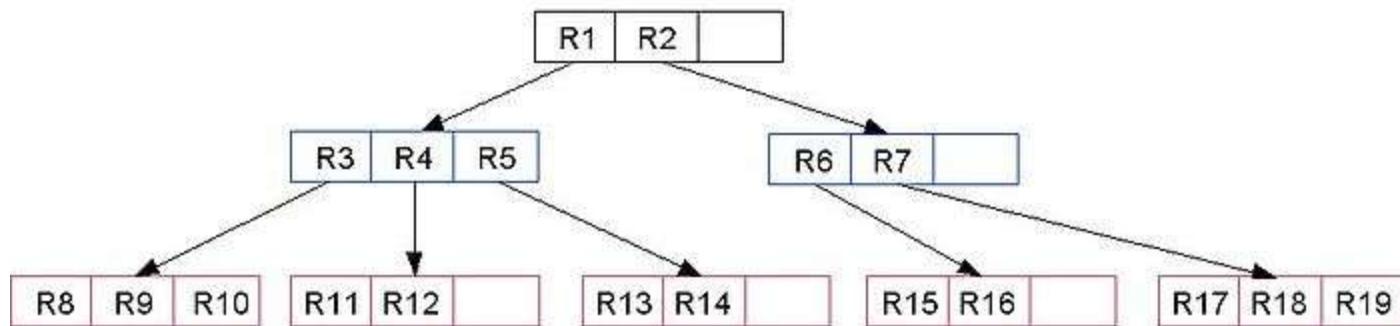
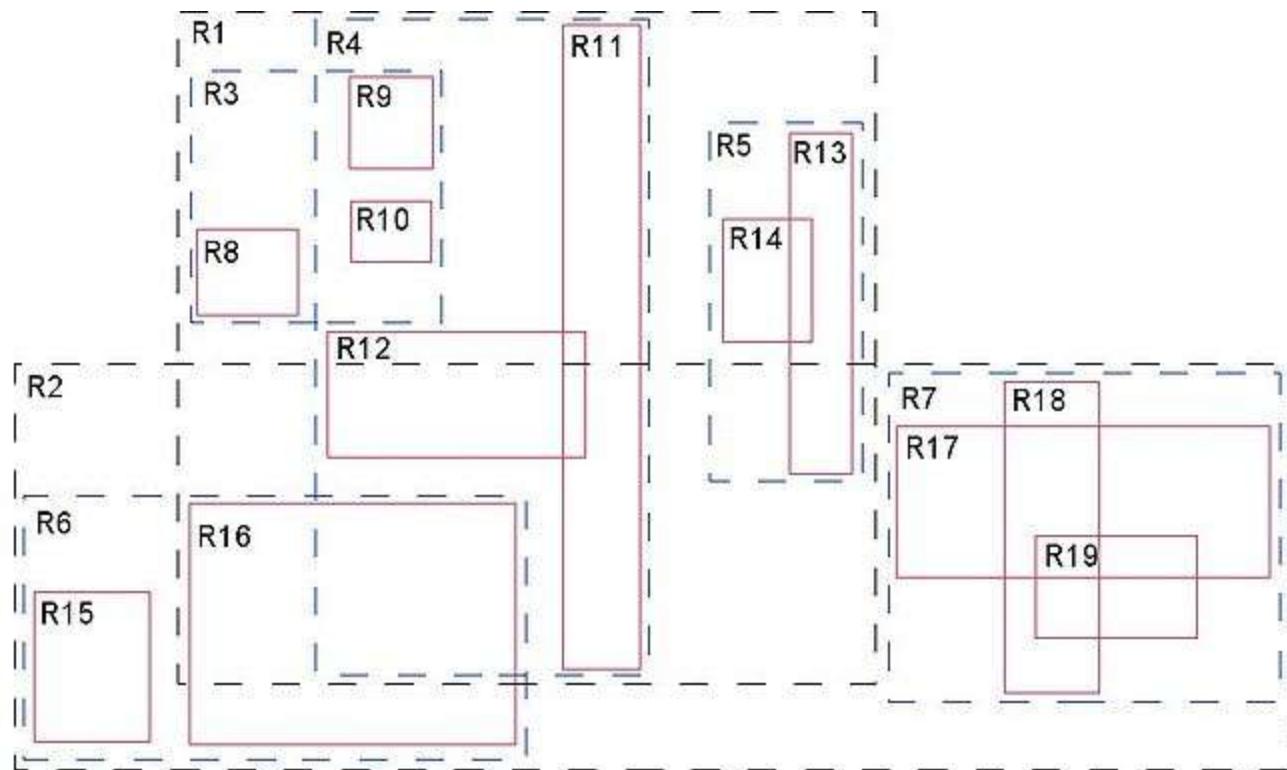
FID	NUM_POINTS	FTYPE	ENVELOPExyz	POINTS <BLOB>
601	2	2

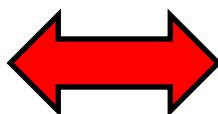


S22 spatial index table

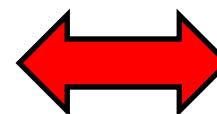
SP_FID	GX	GY	ENVELOPExy
601	3	4
601	4	4

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SQL Server 2008



PostgreSQL

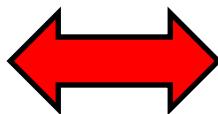


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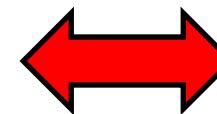
Functionality	SQL-compliant?	Workaround
Topologies		
Implemented as SDE middleware functionality, plus DBMS stored procedures		

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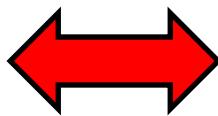
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Functionality	SQL-compliant?	Workaround
Topologies Implemented as SDE middleware functionality, plus DBMS stored procedures		Perform topologic queries via native DBMS functions, post back as views or tables

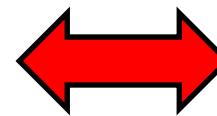
```
-- Validate the layers.
create table val_results (sdo_rowid ROWID, result VARCHAR2(2000));
call SDO_GEOM.VALIDATE_LAYER_WITH_CONTEXT('CITY_STREETS_GEOM', 'GEOMETRY', 'VAL_RESULTS');
SELECT * from val_results;
truncate table val_results;
call SDO_GEOM.VALIDATE_LAYER_WITH_CONTEXT('TRAFFIC_SIGNS_GEOM', 'GEOMETRY', 'VAL_RESULTS');
SELECT * from val_results;
truncate table val_results;
call SDO_GEOM.VALIDATE_LAYER_WITH_CONTEXT('LAND_PARCELS_GEOM', 'GEOMETRY', 'VAL_RESULTS');
SELECT * from val_results;
drop table val_results;
```

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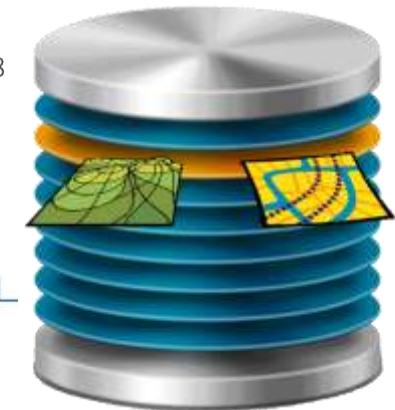
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Microsoft
SQL Server 2008



PostgreSQL

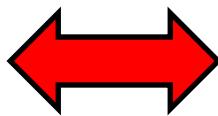


ORACLE

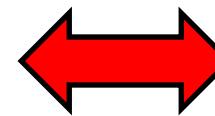
Functionality	SQL-compliant?	Workaround
Rasters		
SDEBINARY storage		

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SQL Server 2008



PostgreSQL



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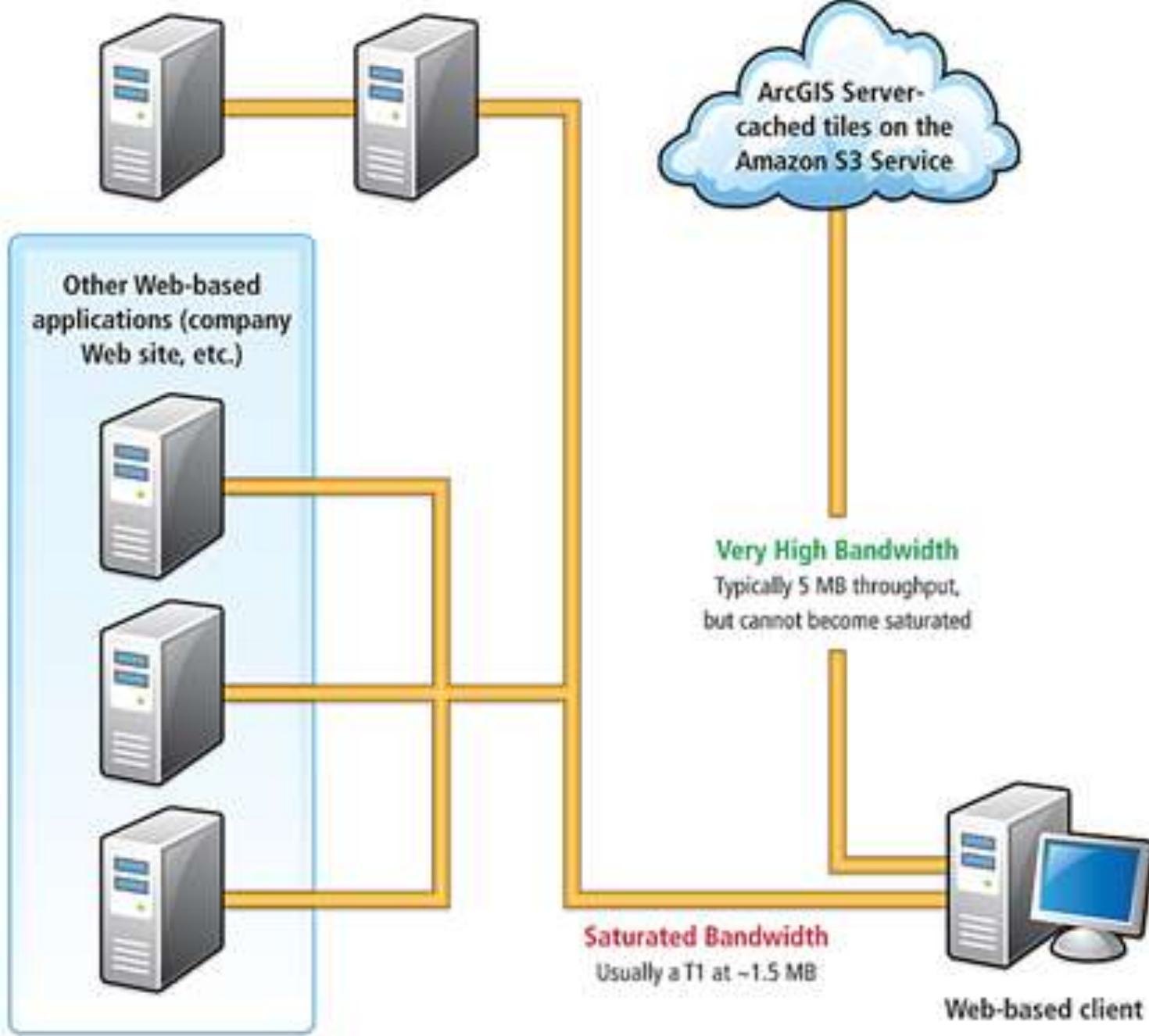
Functionality	SQL-compliant?	Workaround
Rasters		
SDEBINARY storage		Oracle: SDO_GEORASTER PostGIS: PGRaster SQL Server: native binary (specified with dbtune RASTER_STORAGE keyword)

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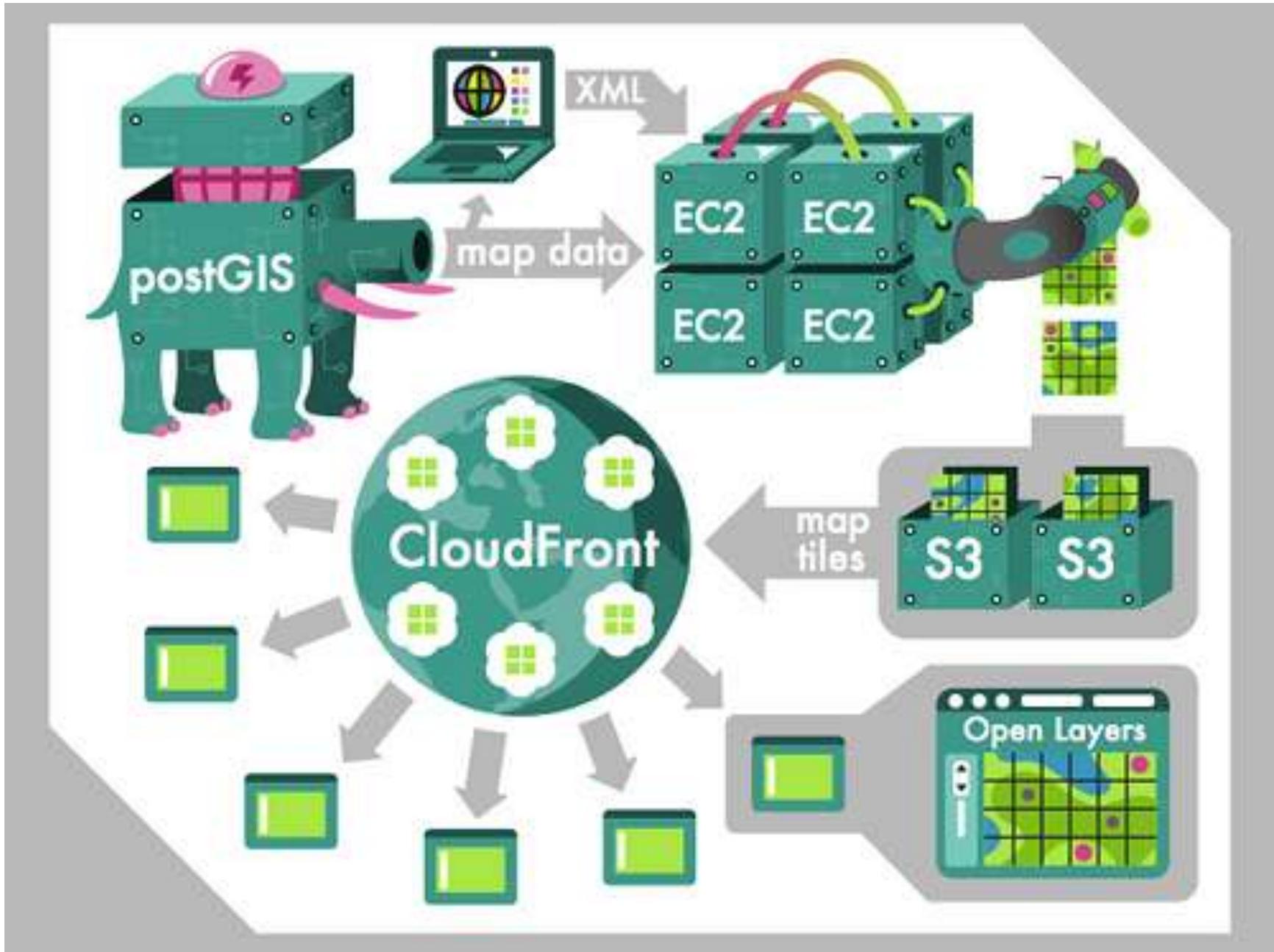
ArcGIS Server SOC
and SOM, serving dynamic
(i.e., MSD) services

ArcGIS
Web server

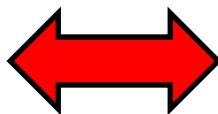


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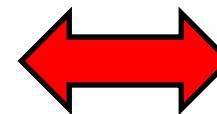
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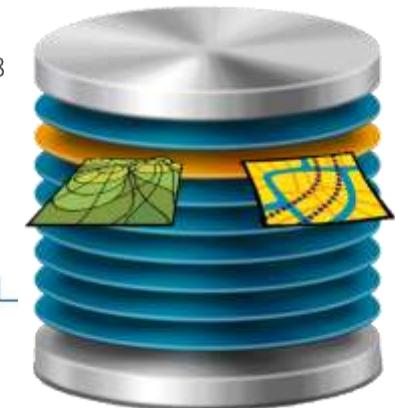
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SQL Server 2008



PostgreSQL



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Functionality	SQL-compliant?	Workaround
GUI editing interface: ArcMap		

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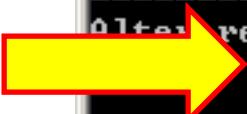


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Other ArcSDE Irritations

- **Although all RDBMS vendors permit editing through VIEWS, ArcSDE doesn't allow this**



```
Command Prompt
-----
sdetable -o alter_reg      -t <table>
[<-c <row_id_column> -C <SDE|USER> ] | <-C NONE> ]
[-L <OFF | ON>] [-M <minimum_id>] [-S <table_description>]
[-U <SINGLE | MULTI>] [-F] [-k <config_keyword>]
[-H <VISIBLE | HIDDEN>] [-R <MANY | SINGLE>]
[-i <service>] [-s <server_name>] [-D <database>]
-u <DB_User_name> [-p <DB_User_password>] [-N] [-q]

sdetable -h
sdetable -?

C:\>sdetable -o alter_reg -t san_pipe_sde -u sde -p sde -s robsonm-sp1 -U multi
-c objectid -C SDE

ArcSDE 8.2      Build 967 Thu Feb 28 22:31:11 PST 2002
Attribute      Administration Utility
-----
Alter registration for table san_pipe_sde. Are you sure? (Y/N): y
Error: Not supported on a view (-251).
Error: Unable to alter registration for table san_pipe_sde

C:\>
```

Other ArcSDE Irritations

- Command line “GUI”, an artifact of SDBE 1.0. It is handy for scripting, however...
- No support for multi-spatial typed columns (e.g., a point and polygon geometry in one table)

The Solution...?



AGIC 2009

Geospatial Education and Training
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